



BECK (C.)

PYOTHORAX AND ITS
TREATMENT

BY

CARL BECK, M.D.

NEW YORK.

Reprinted from the MEDICAL RECORD, May 19, 1894



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PYOTHORAX AND ITS TREATMENT.¹

By CARL BECK, M.D.,

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AMONG all so-called surgical diseases none shows a greater prevalence in this city than empyema. Its predisposing cause is probably due to the rapid variations of climate, which favors so much the development of pleuro-pneumonia. If it be true that figures demonstrate its prevalence, it becomes evident by the fact that, during a period of eleven years, I have performed resection of a rib in this city in one hundred and forty-one cases for empyema. You will find a great difference in the statistics of European surgeons. So, for instance, with the one exception of Koenig (seventy six cases during twelve years), some of the most eminent surgeons furnish reports of between ten and thirty-five cases treated likewise during the same length of time.

The *Universal Medical Journal*, of Philadelphia, in its last issue, June, 1893, published the statistics of empyema treated by F. C. Holt, of Christiania, from 1874 to 1891. It impresses the reader that the twenty-three cases operated upon during this time were regarded to be a large number.

The *St. Louis Clinique*² does not disdain to draw classical rules from the observation even of two cases. That under the auspices of antiseptic principles the question is still pending whether aspiration, incision, or resection should be the treatment is a deplorable fact, the explanation of which, in my opinion, can only be found in the fact that the general practitioner is seduced to at-

¹ Read before the County Medical Society of New York, February 26, 1894. (Part read before the Pan-American Congress, Washington, D. C., September 8, 1893.)

² Arnot Spence, February, 1893.

tempt the solution of surgical problems, which lead to the fields of speculation. One of the few glorious exceptions is represented by Gerhardt (as shown in his excellent essay about diseases of the pleura).

When, last year, I was visiting one of the greatest surgical clinics in Europe,¹ on inquiry I was told by the chief that only one case of empyema had been treated in the surgical ward during the whole year, as the other cases had to be under the attendance of the physician on internal medicine.

At the last Medical Congress in Vienna no less than six methods for treating pyothorax were still advocated ; they were :

1. The expectant treatment.
2. Simple aspiration (done once or more), recommended by Silly, Ewart, Kapteyn, Peri, Hughes.
3. Aspiratory puncture followed by antiseptic irrigation, recommended by Senator, Reichelt, Baelz, Kashi-mura.
4. Permanent aspiration (Bülau's method), recommended by Subbotin, Bowditch, Immermann, Leyden, Curshmann, and Playfair, and modified by Phelps.
5. Simple incision, recommended by Kussmaul, Bartels, Quincke, Ewald, Rose.
6. Resection of one or more ribs, recommended by Roser, Koenig, Schede, Bardeleben, Runeberg, Billroth, Rydygier, Weir, Bull, McBurney, Estländer, Ziemssen, Glaesser, Raczynski, Gerhardt.

There is no doubt that the latter method, resection, is gaining ground more and more, especially among and through the real professional surgeons, and it will be the endeavor of this paper, in analyzing the other methods, to convince you of their insufficiency.

It is particularly Koenig who deserves the most credit for having first offered clear, simple, and methodical indications of a true surgical character.

The genius of my great teacher, Gustav Simon, even

¹ University Place, with five hundred thousand inhabitants.

at the pre-antiseptic era, found a way to heal old cavities by resecting from three to seven long pieces of ribs, thus enabling the thoracic wall to approach the retracted lungs.

I may be allowed on this occasion to give this eminent surgeon, who performed the first nephrectomy, due credit for this ingenious method, which generally is attributed to Estländer.

The last year saw us admire Schede, who obtained satisfactory results by removing even the whole thoracic wall. Ribs had been perforated already by Hippocrates, the great master, and by studying his book "*De Morbis*" one cannot help getting the impression that, long before him, opening of the chest-wall was a well developed operation, the indication for which was well defined and must have also been based upon a very frequent and extensive employment of the different methods of incision by knife, cautery, or by perforation of a rib.

In the seventh book of the "*History of Nature*," Plinius, for instance, describes the case of a certain Pharæus, who, after having been given up by his physicians, wanted to die on the battle-field. But when thrust by a spear into the chest, pus escaped, and the seeker of death recovered—in fact being cured by the weapon in the hands of his enemy. Euryphon, of Knidos, is supposed to have saved the life of Kinesios by opening his thoracic cavity with the actual cautery.

There can be no doubt that, based upon nearly perfect diagnostic means, such operations were performed frequently and successfully during the great Hippocratic era, and that the most of its admirable knowledge had been lost during twenty three centuries.

Is it not astonishing that Hippocrates laid great stress upon frequently washing the patient with warm water, before the operation should be performed? Does this not appear like a dawning of aseptic principles, and explains so well why the successes of operations performed then were so excellent, that some are inclined to doubt their truthfulness?

It would suit the spirit of our sterilizing age to be reminded of the custom of frequent washing by our Hebrew friends, which was made a religious rite by Moses, who must have been the greatest connoisseur of human nature. It is a pity that just this doctrine is so poorly appreciated by some of his Russian offspring.

A slight impression of what we must have lost of the immense knowledge of the school of Kos, and how highly educated Roman surgery must have been, one may gain by visiting the so-called house of the surgeon at Pompeii. The streams of water which were constantly flowing through the streets of Roman cities were certainly apt to remove germs. But more than that—and I do not know if it has ever been mentioned from this point of view—the exceedingly large number of small wells in the house points to the more or less conscious knowledge of the principles of asepsis.

On a recent visit to this most interesting place I felt, more than ever before, how little advanced in fact we are in comparison with the medical civilization of many centuries ago. And why should not the ancient surgeon, with his fine art of diagnosis and with his powerful weapon—cleanliness—have obtained better results than the surgeon of not many years ago, who went directly from the autopsy room after having washed his hands, *secundum artem*, in a questionable fluid, to the operating-room, repeating his anatomical masterpiece on the living subject, and—with the same effect?

It is not at all astonishing that Sedillot, who brought the operation for pyothorax to light again, was not greeted enthusiastically. His results were so discouraging that the greatest surgeon of his time, Dupuytren, when suffering from pyothorax himself, being advised to be operated upon, declared that he would rather die from the hands of God than of the doctors. Bearing in mind that Velpeau had lost all his cases, and that of fifty cases of empyema he had only seen four recoveries, we may well appreciate his conviction.

Later on Sedillot and Langenbeck recommended trepanation, Roser resection. But, as a rule, even among such surgeons as were in favor of resection, it seemed still to be understood that resection should especially be done in adults, while aspiration or incision should be preferred in children, because of their greater tendency to recovery. When I, nearly eight years ago, as far as my knowledge goes for the first time¹ emphasized the adoption of the method of resection for all cases of empyema without regard to its original cause or to the age of the patients, in a paper before the German Medical Society of this city, my views were received very unfavorably. There was indeed not one gentleman present who had not obtained so and so many excellent results by aspiration or incision, that it was a crime to mutilate poor patients by resection without any necessity, and at the end of the discussion I had the feeling that the condemned Shylock was a nobleman in comparison with me.

It is a great satisfaction to me to know that several of the gentlemen present at that time are now of the same conviction as myself, and it seems to be difficult for them to remember that they ever were possessed of a different one. At the same meeting I, on the strength of twenty-four cases, maintained that the main indication for resecting a rib was not only, as usually supposed, furnished by the necessity of having sufficient drainage or to induce the thorax to approach the pulmonic pleura, but for enabling the surgeon to introduce his index-finger, thus making it possible to palpate the pleural walls.

It is, as I repeat to-day, indeed the only procedure which with certainty shows the presence and allows the immediate removal of clots consisting of fibrinous or cheesy products attached to the pleura. My experience has shown me that in nine out of ten cases I could be certain to find such lumps—at an average of goose egg size—free in the cavity as well as fastened to the pleuræ.

As long as we have no physical, mechanical, or specu-

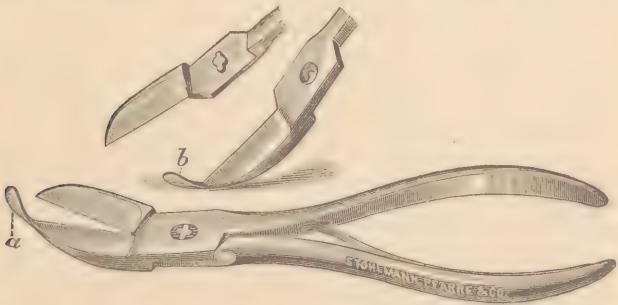
¹ Cf. New Yorker Medicinische Presse, December, 1886.

lative means to distinguish between this condition and a simple collection of pus, or so long as we cannot liquefy these lumps by the use of a dissolving injection first, aspiration and even incision are insufficient and therefore unsurgical procedures. I tried to dissolve such masses by the injection of pepsine, but without avail, as the resection later showed clearly. In three such cases large clots were found afterward. Anæsthesia was only administered when the pulse was strong. Generally caffeine was given before. In the greater number of cases the operation, which can be done in a few minutes, was performed under ether spray.

If the patient or his relatives are adverse to the seeming cruelty of this treatment, their attention can be called to the immense dangers to which an anæsthesia might expose the organs of the thorax, the functions of which are so much impaired already by their compression. Not more than one or two drops of chloroform should be poured into the mask, the smell of which often gives the patient the agreeable impression of getting or being insensible. This may explain why I never met with an accident during operation.

As the diaphragm after evacuation is always rising I usually resected the sixth rib. Only when the extent of the cavity is found to be very small, I incise above the same, using the aspiratory needle as a guide for the incision. As a rule between the anterior and posterior axillary line—under antiseptic precautions, of course—I make an incision about three inches long, which at once divides the periosteum. From here the thoracic walls can be palpated equally well anteriorly and posteriorly. Furthermore, the patient, when brought on the edge of the table, can assume the dorsal decubitus, while, if the incision should be made further back, he would lie on the healthy side, which on account of the pressure of the effusion would expose him to great danger. Then with a small curved elevator I lift the periosteum from the rib, which then is pushed underneath the rib so that the rib rides on the instrument. A

blunt hook retracts the tissues alongside the rib toward the axilla. One blade of a bone scissors is introduced below the rib between hook and elevatorium, and the same cut through. Then the elevatorium is pushed toward the sternum, thus forcing the rib from the last fragment of adhering periosteum, the hook inserted opposite to the wound, and with scissors the same manoeuvre is repeated. If my own elevatorium shears (see cut) are used, it is only necessary to tear away the connection between the periosteum and the rib and cut the rib through, the instrument being of such a shape as to keep the tissue properly retracted. The one blade, if sepa-



rated, can be used as an elevatorium, so that, without having anything else on hand than a knife and this scissors, the whole operation could be performed. A piece long enough to allow the introduction of the finger suffices.

It is impossible to strike the intercostal artery during these manipulations. Iodoform (as a powder or as a saturated solution in ether) is then distributed above the wound surface, to prevent infection from the pus as it flows from the cavity. Through a small opening made into the pleura with a bistouri a Pean forceps is introduced and the pus slowly evacuated. A sponge is pressed against the opening from time to time to interrupt the

stream, to avoid a too rapid expansion of the lungs. (The time of evacuation should be at least twenty minutes.) The finger is now introduced, and lumps, which are now probably found to be adherent to the pleural walls, are wiped off with the index finger or with a blunt spoon made for this purpose (like a spoon for stone in the bladder). If bleeding should occur, this may be deferred for two or three days. An irrigation of a bichloride solution (1 to 5,000) is used mainly for mechanical purposes, that is, to evacuate thoroughly. The pleura is then stitched to the skin with four iodoform silk sutures, forming a mouth (pleurostomia). These sutures at each edge of the wound and two opposite ones at its middle are generally sufficient to cover the wound surface, to prevent secondary hemorrhage, and keep the opening large. Some iodoform powder is put into the cavity to reduce the secretion, then the wound is covered with iodoform gauze. The whole side is protected by a piece of pasteboard-like absorbent moss, which, after being slightly dipped into a solution, adapts itself to the contour of the body like a plaster-of-Paris dressing. A strip of rubber adhesive plaster keeps it tight, so that no air can enter. During respiration it acts like an aspirating valve and absorbs at the same time. After three days a rubber drainage-tube, of the size of a man's index finger, secured by two large safety-pins in the shape of a cross, is introduced. I have refrained from introducing it immediately after operation, since I have witnessed considerable bleeding from it. Undoubtedly the constant respiratory movement of the pleuræ causes irritation in the way of rubbing. It seems that after the pleuræ become more accustomed to the contact of the atmosphere, as soon as granulations appear, they stand the irritation well. As the cavity is, indeed, entirely emptied after the operation, there is no necessity of washing it out afterward. As an average, two weeks after the operation a smaller drain is introduced, which gradually has to be shortened. When the serous discharge be-

comes scanty the drainage tube may be left out and a small strip of iodoform gauze introduced. For the following few days the patient has to be watched very carefully. It may be that the cavity is obliterated the following day, but very often union is only superficial and retention of pus occurs, as an expression of which an elevation of temperature will be noticed.¹ Then, of course, the drainage-tube has to be introduced again, and after a week the same manœuvre must be repeated, until four days after the obliteration no secretion has been showing up and the temperature has remained normal. In doubtful cases the grooved director may reveal the presence of retained pus. The patient should always lie on the diseased side of his thorax, and should be lifted up by the feet about every four hours so that the pus will flow into the dressing. This renders the procedure, as advised by Küster, unnecessary, to make a counter opening to avoid the retention of pus. There is no reason for introducing gauze into the cavity.

The dressing has to be changed twice a day for the first week, later on once a day, and after three weeks only every second, third, or fourth day. The patient, if in any way possible, should get up after one week. The thermometer is controlling the treatment, *i.e.*, the change of the dressing. During the after-treatment for the first few days small doses of morphine are administered for the purpose of immobilization. If the pulse be weak, strophantus or caffeine may be given at the same time. Later on, syrup. ferri iodat. or cod-liver oil is ordered. Nourishment is given frequently in small quantities to avoid distention of the stomach. Great stress is always laid upon the necessity of gymnastics to prevent curvature. My experience leads me to the conclusion that simple empyema, operated early, will only under extraordinary circumstances turn out unfavorably. In other words, the chances of an empyema depend entirely upon the early diagnosis of the general

¹ Cf. history of Case XIII.

practitioner. The diagnosis of empyema has to be made by the aspiratory needle. If there is much cheesy accumulation, or a small cavity, or if the fluid be encysted through the division of the cavity by adhesions, it has to be introduced quite often on different portions. I sometimes have explored ten times before I could corroborate my suspicion. I found it useful, when I could not draw any pus, to push the wire through the needle, a procedure which sometimes made a trifle of pus appear on the end of the needle.¹

After deducting the 24 cases published seven years ago, 117 remain in this series. Among the cases 39 were below three years; 32 were between three and five years; 19 were between five and ten years; 10 were between ten and sixteen years; 17 above this age. Of them 12 died above sixteen years, 5 from tuberculosis; 98 were simple acute cases, 19 were complicated. Among 5 double-sided, 4 recovered.

In the case of a child, two years of age, where I had operated one year ago, and where recovery was perfect four weeks later, I had to perform a resection after a second pleuro pneumonia only four weeks ago on the same side.

All the empyemas with offensive odor (4 cases) died.

The average time of the healing process was five weeks. Recovery of a baby, aged six months, was perfect after six days.

Among the cases of simple empyema (collection of pus—*bonum ac laudabile*—following an acute inflammatory process in the lungs or pleura) in 63 the diagnosis was made early. These cases recovered without exception.

Among the 37 cases which were diagnosticated late, 5 showed the typical vaulting of the thorax. (In two of them a fistula remained; one of them died after resection of seven ribs.)

In 6 cases I was doubtful whether tuberculosis was causing the empyema, or if the long standing of the

¹ Cf. history Case IX.

latter did not cause the tuberculosis. In fact I cannot understand how an accumulation of pus could occupy any portion of the body for months without causing sinister manifestations.

Two cases, where tuberculosis was diagnosticated, and therefore considered non operable, recovered after resection. So they, according to the wisdom of the dissuading capacities, had, as one would imagine, been treated wrongly.

Based upon this experience (similar cases respecting cures are reported by Schede and Güterbock),¹ I repeat that resection of a rib should be performed whenever the presence of pus has been verified by the exploratory needle, no matter if tuberculosis is confirmed or not. What harm can be done by resection? A consumptive has nothing to lose and everything to gain.

As before alluded to, the differentiation between tuberculosis and simple empyema is not so easy as it seems on superficial contemplation. An abnormal condition, for instance, at the apex does not necessarily show the tubercular character of the empyema, and *vice versa* bronchial breathing, râles, and bronchophony during auscultating, the symptoms of compression as well as forced pectoral fremitus, can all be due just as well to a tubercular infiltration of the lung tissues.

I may, for instance, relate the following history: A machinist, twenty-six years of age, showing an excellent family record, took sick suddenly, never having been ill before, with a chill and nausea. Pleuro pneumonia developed, which ended by crisis. Perfect recovery, however, did not follow, but the patient went around for three months while suffering from slight dyspnoea and low fever. Four months after the onset of the pleuro-pneumonia I had a chance to perform resection, but three months later the patient died from tuberculosis. Now, was the acute inflammation already the expression of commencing tuberculosis? Hardly!

¹ Cf. Berliner klinische Wochenschrift of June 27, 1892, p. 655.

In the cases of so-called stinking empyemata other serious suppurative processes had been present. So it may be that the patient succumbed to the multiple pyæmic foci. So if I abstract the deaths caused by pyæmia and tuberculosis, only 5 cases, including the 3 Estländer operations, remain, where I can attribute the fatal result directly to the consequences of the operation.

My results of the so called Estländer's operation were little encouraging. Among 5 cases where I had to resort to it, I saw only 1 recover perfectly (3 died)¹ and another is still mourning his fistula.

In a case of thoracic fistula, existing for two years, I recently tried the following osteoplastic experiment: On a man, thirty-six years of age, who after an attack of pleuro pneumonia suffered from pyothorax, resection of a rib was performed only after repeated aspirations—that is, about six weeks after the onset of the suppurative process. The cavity did not fill up and a fistula still remained fifteen months after the resection. At this time the cavity would hold about a pint of irrigation fluid. The fistula was situated one inch behind the right anterior axillary line at the level of the seventh rib. Probe and finger introduced into the dilated fistula canal, proved that the cavity extended from the second to the eighth rib. Laterally in its centre it reached from the posterior axillary line forward to about an inch to the inner side of the sternum. According to my determination I made a semilunar incision from the upper margin of the second down to the upper margin of the eighth rib, dividing all the soft tissues at once. The beginning as well as the end of the incision was situated at the anterior axillary line. The middle of the segment nearly touched the sternum. While sharp hooks retracted the soft tissues, the periosteum was incised around each rib and with an elevatorium it was freed from its attachments. The rib was divided then with the bone shears. In this manner

¹ Cf. histories.

the third, fourth, fifth, sixth, and seventh ribs were cut through in the direction of the semilunar incision. Then they, still in their connection with the periosteum, could be pushed down into the cavity to a considerable extent. If I had had any difficulty in dislodging the ribs I would have resected pieces of them. The bleeding was insignificant. A very tight dressing consisting of sponges and boards of moss, pressed the fallen-in ceiling of the cavity inward, which had been previously scraped and was slightly packed with iodoform gauze (but only toward the dorsum). Every second day the dressing was changed and pressure made upon the flap. The patient's condition was not impaired by the procedure, and three weeks after the cavity would hold only three fourths of a pint.

Originally it had been my idea to make semilunar incisions, according to the periphery of the cavity, anteriorly as well as posteriorly at the same time, but the fear of insufficient nourishment of the flap prevented me from doing so. Therefore I preferred to divide the same ribs further back twenty-four days after the first operation, when the condition of the depressed portion was such that I could expect the circulation to be well restored. Now the sunken-in area forms a deep depression. In proportion to this two tablespoonfuls of the irrigation fluid is retained only by the cavity. The patient's general condition was very much improved.

It seems that I am justified in hoping for a permanent obliteration. Of course the adaptation of the thoracic wall to the pulmonal pleura is not as thorough at once as after total resection, but it is evident that, if my experiment proves to be a success, the patient enjoys the great advantage of not having suffered the loss of his bony support. At the same time I may call attention to the scant loss of blood, and especially to the impossibility of interfering with the intercostal arteries. (Further remarks about this case I reserve for a future communication.)

In reference to sero fibrinous exudations I may state that I do not approve of resection as recently recom-

mended in Germany. In this connection I may say that in two cases I have injected a ten-per-cent. mixture of iodoform glycerine, with success, into the pleural cavity, after having aspirated first.

In reference to the etiology, I found pleuro-pneumonia occupying the front rank. Among the complete histories I found it eighty-four times, twenty-nine times after influenza; scarlet fever, eight times; puerperal processes and other septic infections, four times; whooping-cough, twice; and diphtheria, once.

As far as the pathological significance of empyema is concerned, I acknowledge that it is very different. The etiology as well as the extent of the exudation, the kind of pus (if thin, thick, smelling, or putrid), the age and constitution of the patient, the pulse, the temperature, the digestion, the subjective condition of the patient, and the stage of the disease, have all to be taken into consideration. Furthermore, it is of great importance to know to what particular microbe the empyema is due, that is if to the streptococcus, the pneumococcus, the tubercular bacillus, the typhoid bacillus, to the staphylococcus aureus or albus. Some empyemas contain simultaneously several forms of schizomycetes.

Netter, in 109 empyemas, found: streptococcus, 51 times; pneumococcus, 32; saprogenous organisms, 15; Koch's bacillus, 12. About half of all empyemas contain streptococci. As this microbe is most commonly found in suppurative processes, and has its domicile constantly in and on the most healthy persons, it is self-evident that it frequently will be demonstrated in pyothorax.

It seems that it especially tends to the formation of solid masses. Its predilection is for the infectious diseases of adults. The pneumococcus of A. Fränkel is more prevalent in the primary empyemas of children. About twenty five per cent. in adults, and seventy per cent. in children.

This form of empyema shows the most benign charac-

ter among all, so that some are inclined to attribute this to the microbe; but it seems to me that the vitality of the organs and the compliance of the thoracic walls, are the main causative factors of the more benign character of empyemas in children. The absence of the tubercular bacillus does not prove the absence of tuberculosis, as it very often is not found. There are empyemas where only Koch's bacillus is found, and there are some where streptococci, staphylococci, and several mixed forms could be discovered. In the latter case tuberculosis has repeatedly been diagnosed by other methods. There is still left a good deal for future investigations, to make these microscopical examinations more useful for the surgeon.

All these points certainly influence the prognosis as well as the after-treatment, but certainly could not prevent me from performing the resection, as long as there is the slightest hope for recovery. *As long as our diagnostic means are so insufficient, that we never are able to know, before the operation, exactly if the lung will expand in proper time or not, we from the start must make our arrangements in such a way that we can meet all eventualities afterward.*

It is certainly very disagreeable, if the patient, for instance, has been promised to be cured by incision, and then the ribs approach each other so much that drainage becomes imperfect and resection must still be done weeks after the incision! An occasion like this will hurt the reputation of the surgeon to the greatest extent.

Among the accidents I have witnessed, I may mention that, no less than four times, I have been called to extract drainage tubes which were imperfectly secured (such as by one safety-pin), or where the rubber was of an inferior quality, so that breakage occurred. Once I removed a drainage-tube, nine inches in length, a year and a half after operation by Bülow's method.

Breakage of a poor rubber tube, however, occurred to myself once, but fortunately I was able to grasp it with the forceps the moment it slipped off.

Once I assisted a general practitioner (cf. history below) who, when trying to stitch the pleura to the skin, broke his needle. I fortunately was able to extract the fragment from the cavity, where, on a level with the second rib, it was already driven into the lung.

In analyzing the six different methods mentioned above, I can hardly say anything else about the value of the so-called expectant treatment, than that I regard it to be a crime. How men of the standing of a Leyden can maintain that empyemata, following pneumonia, are very quickly absorbed as a rule, I fail to understand. I hold exactly opposite views, that is, that absorption takes place only under the most exceptional circumstances, and if it really does, it seems to me to be a great misfortune for the patient, because this procedure most probably furnishes the first step in tubercular infection.

P. K. Pel¹ mentions that the principle, *ubi pus, ibi evacua*, has justifiable exceptions, and that if empyemata be of small size, if the general condition of the patient be excellent, the pulse slow and well filled, if no fever be present, and the appetite remain good, absorption through thickening can be expected. Now, if one should recover from such a healthy disease without having used the exploratory needle, diagnosis will certainly be doubted; and, on the other hand, if an aspiration should have yielded pus, who will dare to recommend expectant treatment? Simple aspiration is to be condemned because it may only cure some of such cases, where no clots are present, and, as we have explained above, we have no means of knowing of their presence otherwise than by making an opening, which allows the introduction of the finger; it is a hazardous procedure. When Pel says: "We, without performing resection several times, had perfect results," I may answer that I hardly know of any disease which, no matter how badly it was treated, has not occasionally been cured, in spite of bad treatment. It is a pity that the advocates of the aspira-

¹ Zeitschrift für klinische Medicine, p. 211. Berlin, 1890.

tion never have an opportunity to see the clots, and therefore they are under the impression that there are no such things in existence. They are satisfied in aspirating a certain amount of liquid pus; the patient is relieved and gladly submits to a second and third aspiration, because a stab with the needle is indeed no operation, and the most unsurgical physician can perform it.

If the patient could with his intellectual eye see the lumps in his pleura, common sense would teach him, the layman, that they never can be aspirated. But as it is, he will be aspirated so long till he is emaciated; and he is sucked, in the truest sense of the word, till the lungs become contracted. Then, as a last resort, resection may be recommended, which at this late stage, when the expansion of the lungs is so much interfered with, usually proves to be a failure.

From this the aspirating enthusiast deducts that resection is an operation which yields a bad prognosis, and that "he never saw a good result from it." Albert says very well, in reference to aspiration: "This procedure is analogous to the pumping out of other abscesses, for instance, suppurating buboes. In such cases a variety of aspiratory instruments have been tried, and once in a while a cure was effected."

The only courageous and clear treatment is the broad opening.

This whole surgical business is strictly analogous to the interference of a badly trained midwife. It is a great satisfaction to me to state that, among my personal professional friends, I have been able to convince every one of them of the incorrectness of aspiration, although they all, more or less, had experienced a few results with it. For conviction I needed only to invite them to a resection at the hospital, and when they had seen me remove the clots from the pleura, they confessed they did not have the slightest idea of their existence, otherwise "they would not have tried their adventurous policy."

Aspiration, however, is by no means an innocent manip-

ulation. The irritation in the pleural cavity may produce epileptic spells, vertigo, nausea, fainting, and even fatal collapse. At the same time a nervous physician may interfere with an intercostal artery. (As reports show, death has occurred repeatedly through extensive bleeding.)

Upon aspiration, followed by irrigation, only a few surgeons rely, so far as my knowledge goes. The idea to wash out solid particles is, of course, a very good one, but regarding the large size of the lumps, the evacuation through the small tube is absolutely impossible. Therefore, this method, which fifteen years ago was received with great enthusiasm, has dropped into deserved disuse, and in fact is identical with simple aspiration.

Nearly the same can be said about the aspiration followed by permanent drainage (Bülau's method). In cases of simple empyema of short standing, where the lungs still expand easily, or wherever there are no lumps present, this method would be the ideal one. It consists in puncturing the pleural cavity with a trocar, into which a rubber tube can be introduced, this being long enough to reach a bottle partially filled with an antiseptic solution.

Analogous to the syphon-drainage after lithotomy, the pus should be constantly aspired, as negative pressure in the pleural sac is caused. But as the lump question cannot be settled before a free opening is made, this method is nothing but an interesting experiment, although the author's results deserve attention.

It is certainly very interesting, that once in a while fibrinous products, especially when tightly attached to the pleural walls, can slowly be absorbed. But as we, in fact, are not at all able to judge the conditions under which this takes place, and furthermore, as we, while trying to find out if the solid masses will be absorbed, or if we must not resect anyway, are losing so much precious time, it is only little better than the simple aspiration. Besides it is very probable that the absorption of the cheesy

masses, if it exceptionally should occur, would favor tuberculosis. The tube, however, becomes easily displaced, so that its main advantage—the hermetical exclusion of the air—is void. Finally, the treatment can only be carried out in a hospital.

The method of simple incision has still many advocates, who claim that a small incision suffices. Furthermore, any general practitioner could perform the operation; while resection, a very difficult and mutilating operation, would require the skilful hand of an excellent surgeon. Resection should therefore be only performed in such cases where, after several months' treatment, the ribs have approached each other so much as to make drainage impossible.

In reference to the first point I may say, that if we open an abscess nowadays, we do not think that a small opening suffices, but we make the incision as broad as possible. Indeed, so wide that, if we have a chance, we try to overlook our whole field of operation. We may palpate the walls of the abscess and find, besides its thin lining membrane, necrotic tissues. After having noticed them, the immediate removal is a matter of course. Only after this do we mean to have evacuated our cavity thoroughly. Then we do not need to wash it out every day, as only a serous secretion is to be expected, and the natural sequence is a perfect and quick recovery.

Would a surgeon have the audacity to lance a large abscess anywhere else, to introduce a small drainage-tube, and to wash it out every day? Such surgeons perhaps change their antiseptic fluid once in a while, assuming this perhaps to be the cause of the insufficient progress? And where is the difference between this and a pleural abscess?

I am not able to overlook the field of operation and to introduce my finger into the pleura after incision. I can wash out small but no large clots, and it is impossible to diminish them inside. Furthermore, I cannot detect those clots which adhere to the pleural walls. So they

undergo fermentation and if the patient's condition stands it, they become decomposed, and until then, under repeated febrile elevations become dissolved and are then washed out. Therefore irrigations cannot be dispensed with, which are destroying those very adhesions which we need so much for the obliteration of the cavity. How important these adhesions for the agglutination are, has been emphasized already in 1865, by Dr. A. H. Smith, of this city.

That retention of pus is always present in this condition is self understood. In regard to the difficulty of the operation, I am confident that herniotomy or tracheotomy, operations which every general practitioner should be able to perform, are much more difficult. As far as the possibility of interfering with the intercostal artery is concerned, this accident, on account of the anatomical situation of the same, happens much more easily than during resection. The incision is only made as far as to the periosteum. Then with blunt instruments the tissues, in which the artery is imbedded, are pushed aside, so that it can easily be seen and avoided. For the same reasons there is no loss of blood, while after incision through the intercostal space, fatal bleeding has repeatedly occurred. In reference to the scarcity of the moving together of the ribs, I find that this condition is the rule. In fact it is a healing process, it is the healing tendency of nature itself which makes the ribs approach, and so the remedy itself in this case is a prevention of the cure, because it occludes the opening.

Altogether, the only rational method of treating empyema is the subperiosteal resection of a piece of rib. It is a clean, easy, safe, and nearly bloodless operation. It guarantees a large opening for a sufficient length of time, and the resected piece, if the periosteum has been preserved, is always restored. Scoliosis I have never observed, with the exception of one case of Estländer's operation.

Among the histories I may report the following :

CASE I.—Mrs. B——, aged fifty-six, a widow, shows a healthy family record. In April, 1882, she had an attack of pleuro pneumonia, which was followed by pyothorax. After several aspirations, each of which gave temporary relief, I was asked to make an incision. But I insisted upon performing resection, which was done in presence of Drs. Waechter, Stutzer, and George Stiebeling, of this city. During the three weeks following the operation hectic fever was almost continually present, which weakened the patient considerably. Irrigations were made daily. Nearly every third day, I confess to my own shame, I tried another irrigation fluid, in the erroneous supposition that “in hoc signo” I would be victorious. In this manner I used boric acid, salicylic acid, acetate of alumina, carbolic acid, chloride of zinc, and at last, in my despair even made irrigations with solutions of tinct. iodi and of argent. nitr., with a bad result, of course.

Just by accident I happened to introduce my finger to palpate the pleuræ. To my great surprise I found a large amount of adherent tissues, which I instinctively removed at once. On the following day the temperature was normal, and after a few weeks the healing process was perfect. So far as I know the patient is still enjoying good health.

This case taught me to carry out the principle of cleansing more extensively *a priori*.

CASE II.¹—A. L——, a girl aged one year, sickened with pleuro pneumonia on the right side. Pyothorax followed, which was recognized by Dr. A. Aronson, of this city.

Five weeks after the onset of the inflammatory process I performed resection. Six weeks later healing was perfect. Two weeks afterward pleuro pneumonia developed at the opposite side. Resection of a rib was performed fifteen days after the beginning of the pleuro-pneumonia for an empyema of small extent. Lumps were present this time as well as at the first operation. Re-

¹ Case presented to the German Medical Society, March, 1890.

covery took place three weeks after the operation, while being treated as an out-door patient.

CASE III.—M. R——, a boy six years of age, took sick with acute inflammatory symptoms which were supposed to be dependent upon typhoid fever. Four weeks later Dr. L. Haupt demonstrated the presence of pus. Resection was done immediately. Lumps were present. Recovery was nearly perfect, when, four weeks thereafter, the parents suddenly left for California, where, as it seems, through great negligence, a fistula became established. After four years' stay the patient returned to New York, where I found him in a desperate condition. The old fistula led into a cavity which extended from the second to the fifth rib, and from the margin of the sternum to the right anterior axillary line. After having resected the second, third, and fourth ribs correspondingly, perfect recovery took place five weeks later.

CASE IV.—E. F——, a girl fourteen years of age, suffered from pyothorax after she had gone through a pleuro-pneumonia, as stated by Dr. A. H. Stiebeling.

Four weeks after the onset of the acute symptoms resection of a rib was performed by me. (Lumps found.) After three months I was summoned again, as a discharging fistula still existed. I dilated and scraped. After an absence of five months I saw the patient again. Now I found that an assistant had performed resection of the sixth and seventh ribs, but only to the extent of a half inch, just to "make the rib sink in," as his idea was, but this scheme did not work, as the same *status quo ante* was still present. Now I resected a very long piece of the fifth, and two shorter ones of the sixth and seventh ribs corresponding with the roof of the cavity, which would hold about three tablespoonfuls of fluid. Four weeks thereafter recovery was perfect.

CASE V.—Miss E. L——, thirty-three years of age, of good family history, took sick with chills and sharp pains in the right side. She had coughed a good deal, and about three weeks after the onset of the disease (un-

doubtedly a pneumonia) was able to be about again. After this she was treated by her physician for two months, but only occasionally, until chills and pain in the right side compelled her again to stay in bed.

Dr. L. Weyland, who was called in now, found a prominence of the size of a man's fist at the right thoracic wall, the centre of which corresponded with the sixth intercostal space. The diagnosis of an empyema necessitatis was made then and an operation performed by me without delay. Considerable improvement followed, but a fistula remained, which in spite of repeated scraping, gymnastic exercise, and pneumatic treatment in Williams's cabinet, could not be obliterated. Therefore I undertook a resection of the fifth and sixth ribs to the length of five inches, as corresponding with the middle of the roof of the cavity. This was followed by a considerable decrease of the secretion, but still a year thereafter the cavity had not filled up.

Two and a half years after the onset of the disease I performed a third resection (St. Mark's Hospital). After the patient had inhaled only a few drops of chloroform, pulse and respiration stopped. It was a long time before we succeeded in resuscitating the patient. I now, without administering any further anæsthetic, resected four ribs more (third, fourth, seventh, and eighth). The very large opening was covered with iodoform gauze. After the operation was over the patient, still lying on the operating table, overwhelmed me with the assurances of her gratitude, a fact that shows clearly that she did not consider the omission of further anæsthesia to be a cruelty. Six months later the cavity had become so small that it could hold only one-half tablespoonful of an irrigation fluid. In accordance with this the patient's general health was excellent. In spite of the removal of seven ribs altogether, only a very moderate lateral curvature could be noticed. During the epidemic of spring 1891 she became affected by the influenza, to which she succumbed quickly.

CASE VI.¹—A. N——, thirty years of age, from a healthy family, took sick with repeated chills, disturbances of digestion, and rapid emaciation. He was treated first for malaria at his home in South Carolina, but when a slight cough set in, he was supposed to be tuberculous, wherefore he was sent to New York, as at this time, under the jubilee hymns of the Kochian Tuberculine era, an antituberculous institution had been established. There, however, in spite of the hyperactivity of the hypodermic syringe, the art of diagnosing had not been forgotten, and it was recognized that an abscess, originally situated in the liver, had perforated into the pleural sac.

The patient was brought to my department in St. Mark's Hospital, where I, after having performed resection of a rib, could make out a cavity of the size of a goose egg in the parenchyma of the liver. The communication with the bronchi could be demonstrated by irrigating an antiseptic fluid. The first few times when I did this, the patient got such a severe attack of cough that he became dark blue in the face, and dyspnoea was so serious that I was very much alarmed. Finally, we both became accustomed to this phenomenon, and I could frequently demonstrate before my students the connection between cavity and lungs by irrigating. Six months after the operation the patient had gained thirty pounds, but there was still a cavity, wherefore I resected two ribs. Hereafter the cavity became smaller. I then lost sight of the patient. His general condition was excellent.

CASE VII.—E. W——, boy, six years of age, shows a good family record. Three years ago I was called twice to perform intubation resp. tracheotomy for laryngitis. Each time I postponed the operation, and, as it is evident, with perfect success. (If intubation had been done, the result would certainly have been a good one, and it would naturally have been supposed that it had saved the patient's life.) Now, after a preceding pleuro-pneumo-

¹ Demonstrated before the German Medical Society of the City of New York, June meeting, 1892.

nia, empyema had developed, which was aspirated, without success as usual. The house physician was desirous to perform a resection himself, and asked me to lend him a helping hand. Everything went on nicely until the operator, too ardent in his desire to get the needle through the pleura, drove the needle into the rib, so that the needle broke. The fragment could not be found. Although the optimistic colleague assured me that he saw it fall on the floor, I insisted upon palpating the pleural cavity. Here I soon discovered it at the level of the second rib, where it, being an inch long, had already perforated the lungs. As the sixth rib had been resected, I could just reach it with the tip of my index-finger. By pressing it against the thoracic wall I at last succeeded in dislodging and making it fall down during inspiration. I had already given up hope of catching it this way, as I was afraid to push it farther inwardly by the use of a forceps during the respiratory movements, and had therefore thought of resecting the second rib. The patient recovered in spite of all, and as it is my principle never to allow a member of the family to be present during operation, this incident passed unnoticed.

CASE VIII.—O. F——, boy of fifteen, took sick with pleuritis five weeks ago. The effusion first was of a serous and later on of a purulent character. When I was consulted by the house physician, I found the patient somnolent, in cold perspiration and with great dyspnoea. The temperature was subnormal and the pulse could hardly be felt. The exudation extended over the entire half of the thorax. I declared that, under these circumstances the operation should be performed without delay and without an anæsthetic. To this latter proposition the house physician objected most emphatically, especially because the father objected to the cruelty of such a procedure. When I declined to intermingle in this aspect of the question altogether, the colleague reproached me with injuring him in his position as the family physician.

I cannot spare myself the blame of having been thus intimidated and having sacrificed my scientific conviction to etiquette.

The punishment, however, was not long in forthcoming; after the patient had inhaled only a few drops of chloroform, the respirations, heretofore so frequent, stopped entirely and the face became cyanotic. I had insisted upon administering the anæsthetic myself, and was at once ready with tongue forceps, dilator, and electric apparatus. With this armamentarium and artificial respiration I, after half an hour's work, resuscitated the patient. Then the operation could be performed without any objection to the not administering of the anæsthetic, so that at last the patient did well.

This was a good lesson for the colleague as well as for myself.

CASE IX.—S. R——, girl of ten, four weeks after the onset of pleuro-pneumonia was aspirated for empyema in a hospital of this city. One week later an incision was made. When six months hereafter recovery did not take place, a resection was performed. This was done with a chain-saw, and just as much of the rib had been removed as to enable a thin lead pencil to slip through the opening. Into this small canal a rubber drainage-tube of the thinnest calibre was confidentially introduced, which after it had courageously resisted the permanent rush of the retained pus, at last resigned and broke beneath the safety-pin, which alone kept it *in situ*. As the parents moved just at this time to Long Island, the dressing was not changed for nearly a whole week.

It was reserved to Dr. Voegtle there to ascertain the error loci of the drain-fragment. With his aid I performed a more thorough resection, and could then, as introduction of my index-finger was very easy, extract the fugitive tube without any trouble. Scraping of a large amount of granulations completed the procedure. Four weeks later recovery was perfect, after the poor child had

been aspirated, incised, and resected, first with saw and then with shears.

CASE X.—In reference to the case of the tubercular machinist mentioned above, I may state, that on account of insufficient technique the exploratory needle, although repeated by one of the most prominent authorities of this city, yielded no pus. On account of this, the well-developed dulness was supposed to be due to an infiltration. Three days later, when I saw the case for the first time, I aspirated three times until I found pus.

A more striking illustration of the difficulty of the exploratory technique is the following case, which shows how grave an error I committed only a few months ago :

CASE XI.—A. R——, two years of age, of a good family record, was sent to my office with a letter from Dr. Moskiviecz, stating that the child had suffered from pleuro-pneumonia, and that this was followed by empyema. Aspiration had yielded pus, and so he had referred the patient to me for operation.

The parents took the child first to another physician, a very well-known diagnostician in this city, and one who has had much experience with empyema. After several aspirations, in which he failed to find pus, he stated that no operation was required. The child not improving, it was brought to me. I made six aspirations, and then the parents objected to its further use, so I became somewhat perplexed and did not give any positive opinion about the case, although the symptoms of dulness, weakened respiration, and the history were in favor of empyema. The question of operation was, therefore, deferred for twenty-four hours. The next day pus was found and the operation performed.

After resecting the rib I found a small cavity filled up with an immense cheesy mass, only about half a tablespoonful of pus being present in the cavity. The aspirating-needle undoubtedly had been inserted into the mass repeatedly, and could naturally draw no pus.

CASE XII.—L. I——, aged twelve, had developed empy-

ema after pleuritis. The exploratory needle yielded pus. On the following morning I had determined to operate on the child at St. Mark's Hospital; but during the night repeated attacks of cough, lasting several hours, brought on a considerable amount of expectoration.

On the morning I repeated the explorations a dozen times without finding pus, so that I, regarding this rapidly improved condition of the patient, restrained from operating. Shortly after perfect recovery took place. I assume that in the night, perhaps induced by the puncture, perforation into a bronchus had taken place.

CASE XIII.—M. T——, a girl aged eight, with the same history, recovered after I had drawn pus. On the following day, before I wanted to operate, I could not find any more pus, even after I had aspirated a dozen times.

In this case no cough had been present. Perhaps there was a connection here between irritation by puncture and rapid absorption.

CASE XIV.—M. L——, aged six, strong boy with good family record, took sick, after having swallowed a considerable amount of orange kernels. He located his very sharp pains in the right iliac fossa, had vomiting and slight convulsions. The temperature was 106° F.; pulse, 144; respirations, 42. It was not at all unnatural that the house physician thought of appendicitis, much more so as one of the patient's comrades had, during play, taken gymnastic exercise by jumping on his abdomen.

One of our most prominent surgeons was called in at once, who, as he could not ascertain any resistance in the right iliac fossa, advised expectant treatment. The right leg of the patient could be lifted without causing any pain. At the same time I had a chance to examine the patient. I got the impression that a difference of sounds was obtained by percussing the right lower lobe. But as the nuance was only slight, and people as a rule do not have much confidence in the percussion of a surgeon, we

agreed to have a well-known specialist for lung diseases present, who indeed, when he had examined the child on the following day, could now easily make the diagnosis of pleuro-pneumonia.

Three weeks later I performed resection for empyema. The patient improved rapidly, until the house physician, three weeks later, tried to do without a drainage-tube. The opening obliterated outside at once, but a few days afterward chills set in. As no subjective symptoms, especially no pains, were present, typhoid fever was thought of by the attending physician, a diagnosis which was corroborated by one of the greatest clinical teachers of this country.

When I was called, two days later, I, by forcing a grooved director into the old scar, could easily demonstrate the presence of pus. It is superfluous to say, that its evacuation cured the "typhoid" immediately. A drain was introduced again, and eighteen days later perfect recovery had taken place.

